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Water Quality Report

Kelly Bar Habitat Enhancement Project

Salmon/Scott River Ranger District, Klamath National Forest
Siskiyou County, California

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Water Quality

Methodology

Analysis Indicators and Measures

- Potential of increased temperature loading to the Salmon River. The potential for increased stream temperature is approximated by the length (linear feet) of stream channel and subsequent riparian vegetation disturbed by the project placed into context at the watershed scale. The North Coast Regional Water Quality Control Board and US Environmental Protection Agency have listed the Salmon River as impaired due to elevated water temperatures. The Salmon River Total Maximum Daily Load (TMDL) and Implementation Plan was prepared to reduce the temperature issues in the watershed over the long-term (NCRWQCB, 2005). The Plan uses shade from riparian vegetation as a surrogate measure for stream temperature.
- Likelihood of increased sediment loading to the Salmon River. The potential for increasing sedimentation is approximated by the area (acres) of soil disturbance at the project site. The risk likelihood for sediment is based on the Equivalent Roaded Area model, which translates management actions to acres of impact and developed thresholds of concern for impacts at the watershed scale. The range of impacts below in Table 1 is based on the levels of impact in relation to the thresholds of concern and in this case, can put potential sediment loading into perspective.

Table 1. Range of risk relating to Equivalent Roaded Area (ERA) acres

Range of ERA acres*	Risk Likelihood
Up to 3 acres	Low Risk; 1% of the Threshold of Concern (TOC) acreage
3 to 31 acres	Moderate Risk; 10% of the TOC acreage
31 to 311 acres	High Risk; 100% of the TOC acreage

*The range of acres at risk are based on the modeled TOC for the 7th field watershed in which the project occurs. For this project, the TOC is 371.45 acres. There are currently 60.2 acres of disturbance within the watershed, therefore a disturbance of 311 acres would result in reaching the TOC acreage within the watershed. A moderate risk likelihood is calculated as 10% of the disturbance of high risk acreage and a low risk likelihood is calculated as 1% of the disturbance of high risk acreage.

- Changes to fluvial geomorphic condition within the project area, including river channel and side channel stability, side channel and floodplain inundation, off-channel habitat complexity, river bar grain size, large woody debris, and riparian vegetation.
- Changes to water temperature and dissolved oxygen (DO) within proposed constructed ponds. The measure for this indicator is river flow and water quality monitoring data in relation to water quality in the North Fork Salmon River, these changes are discussed in order to inform potential affects to fisheries resources.

Spatial and Temporal Bounding of Analysis Area

The spatial bound for this analysis is the Shiltos Creek-North Fork Salmon 7th field hydrologic unit (HUC 18010210020706). This boundary is appropriate for assessing the project impacts as they might be experienced by an aquatic organism at the confluence with the Salmon River.

The short-term temporal bound for the analysis is 2 years and is based on the assumption that an overbank flow event has a high likelihood of occurring within 2 years of project implementation. The long-term temporal bound for the project is 10 years because it is expected that any potential reductions to stream shade (and indirect and cumulative adverse effects to water temperature) from project activities will recover within 10 years, if not more quickly.

Affected Environment

The project area is in an alluvial valley at the base of steeply sloping, forested, drainages of eroding metamorphic and granitic geology. The project area encompasses about 12 acres, and includes (1) the confluence of perennial Kelly Gulch with the North Fork Salmon River, (2) Kelly Bar; a wide overbank bar complex on river right upstream of the Kelly Gulch confluence; and (3) West Bar; a bar complex on river left across from the Kelly Gulch confluence. The bars have been reworked by historic placer mining and dredging and now mostly consist of simplified, barren, large alluvial floodplain (comprised of sand, gravel, and cobble), with several sparsely vegetated, discontinuous, remnant high-flow side channels, and vegetated alluvial terraces. The high-flow side channels are largely dry throughout the summer and fall, as are two ponds on Kelly Bar. The side channels lack complex habitat including large woody debris and riparian vegetation, and therefore, the area has been identified as a high priority for riparian restoration (SRRC, 2008).

The Salmon River hydrologic area (as defined by the North Coast Regional Water Quality Control Board), which includes the North Fork, is registered on the Clean Water Act 303(d) list as impaired for temperature, as part of the Klamath Hydrologic Unit listing (NCRWQCB, 2005). As part of the listing, the 2005 Salmon River Total Maximum Daily Load (TMDL) for Temperature and Implementation Plan adopted a temperature “loading capacity” limit for the river (NCRWQCB, 2005). The threshold of no more than 5°F rise in the temperature of cold water above natural receiving water temperatures applies to the river within the project area, including the confluence of Kelly Gulch and the North Fork Salmon River.

For this project, water temperatures were continuously monitored in the river and Kelly Bar for one year prior to design, between October 2014 and September 2015. During the monitoring period, peak river water temperatures exceeded 19°C beginning in late May, and rose above 22°C by mid-June, in September river temperatures fell below 19°C. Generally, groundwater temperatures along Kelly Bar remained lower than river temperatures in the summer months, but remained warmer than the river as it cooled in the fall. Given that river flows were extremely low during the latter part of the monitoring period, both river and groundwater summer temperatures would likely be lower during more typical water years.

Eleven discrete water temperature and DO measurements were also collected between November 2014 and July 2015. DO in the groundwater readings were lower than DO in the river and Kelly Gulch. DO levels across the six groundwater wells remained near 5 mg/l or higher except for the well located near the proposed Willow Pond where DO concentrations of 0.3 mg/l were recorded August 2015, this was the lowest value recorded (see Table 2). During the water quality monitoring period, monthly mean flows in the North Fork Salmon River were above average compared to historical data during fall and winter months (Oct. – Feb. 2014, except for January). However, they were well below average during early spring and summer months (Mar. – Aug. 2015). In 2015 during the focus period for fish and when DO measurements in Willow Pond were below 5 mg/l, the river was 35% of normal in April, 22% of normal in May, 23% of normal in June, and 39% of normal in July. The water year during the timeframe of this monitoring effort was 74% of normal. Given the low DO measurements in Willow Pond, additional

monitoring of the feature was initiated beginning in April 2018 (see Table 2). To date, the current water year has been 73% of normal.

Table 2. Water temperature and dissolved oxygen (DO) measurements in Willow Pond.

Month & Year	Temp. (°C)	DO (mg/L)
October 9, 2014	17.2	4.24
February 6, 2015	8	11.2
April 26, 2015	10.8	2.98
May 28, 2015	12.5	3
June 22, 2015	15.6	2.61
July 29, 2015	19.1	0.7
August 11, 2016	17.1	0.3
September 14, 2016	17.8	4.20
April 19, 2018	6.2	5.3
April 26, 2018	6.6	7.4
May 6, 2018	6.8	7.11
May 18, 2018	8.2	6.13
May 21, 2018	8.3	5.32
June 10, 2018	10.5	4.37
July 3, 2018	12.9	2.59
July 30, 2018	16.5	1.47

Additional measurements were taken of the surface water at Willow Pond on April 26, 2018, which was generally 3-4" deep at the time of measurement. In the shade, the DO measured 13.5 mg/l and the temperature was 10.3°C, while the same water in the sunlight was measured at 12.1 mg/l for DO and 20.6°C. The comparatively low DO measurement in the groundwater on that date shows the effect of surface air mixing on DO concentrations as the water is exposed to the air (Greig et al., 2007 and Wilson 2010).

The effects of surface air mixing increasing DO concentrations in exposed groundwater has also been observed when sampling water quality along the Red Bank river bar in 2016, just down river of the Kelly Bar project area. The hyporheic flow consistently showed lower DO in groundwater wells, but increased with air exposure as it emerged into the adjacent side channel.

The 1964 flood shifted the river channel alignment to the west, placing it at the toe of the river valley, where it has remained since. As the river has cut down through its current channel the river bars have

become perched above the river, resulting in high vertical banks adjacent to the river, which limit the river's access to the floodplain. The active channel of the river and bar systems have the potential to shift substantially during extreme flow events (i.e., greater than 50-year return intervals), but will likely undergo only smaller shifts in the channel as it responds to moderate flow events, as has occurred since 1964.

The modeling results (Michael Love and Associates 2016) indicate that flows remain within the main channel of the river until approximately a 1.1-year flow event, where flows begin to expand onto the river bars. The overflow channel on Kelly Bar becomes active at about a 2.2- year event. The mid-bar channel on West Bar becomes active at about a 1.1-year event. The back-bar Channel on West Bar begins to receive a small amount of flow during a 2.2-year event. Neither Kelly Bar nor West Bar become fully inundated, with water spreading from valley wall to valley wall, until greater than 10-year events occur.

Kelly Gulch flows onto Kelly Bar as a steeply sloping single-thread channel and delivers a sediment load of sands and small gravels to the bar. Downstream of the Sawyers Bar Road bridge, sediment deposition causes the channel to split into multiple, less defined threads. During the summer, flows often become subsurface, eliminating a direct connection to the river, then emerge again at the river bank. Along an approximate 100-foot length of river, shallow margin flows in the river are substantially cooler due to inflow from Kelly Gulch. One of the multiple channels forming Kelly Gulch creates a perennial surface flow source to Kelly Pond, a depression in the floodplain that was created as a hunting pond and has since mostly filled in. The pond also receives flow from an excavated ditch connection between the back-channel adjacent to Sawyers Bar Road, beginning with about 2-year events. Willow Pond, currently a shallow depression at the upper end of Kelly Bar, also begins to receive flows from the back-channel at about 2-year events.

For a detailed description of the affected environment (including annual precipitation, peak flows, flow analysis, water quality, and hydraulic analysis) refer to the *Kelly Bar Off-Channel Fisheries and Riparian Habitat Enhancement Project – Basis of Design Report* (Michael Love and Associates 2016).

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

If the No Action alternative is selected, there will be no soil or vegetation disturbance by this project within the 7th field analysis watershed. However, currently, both Kelly Bar and West Bar have degraded riparian habitat and water quality.

The No Action Alternative would continue to directly and adversely affect water quality by maintaining poorly developed side channels which lack complex habitat, including large woody debris. The river will continue to flush water, sediment, organic material, and racking wood too quickly through the project area. The perched side channels and lack of large woody debris has resulted in simplified off-channel habitat and limits the rivers connection the floodplain. This lack of floodplain inundation and hyporheic flow limits shade creating riparian vegetation, which raises water temperatures. Additionally, the lack of fine sediment and organic material further limits locations of natural vegetation recruitment. There are no beneficial direct or indirect effects from this alternative.

Cumulative Effects

The effects of mining activity within the watershed is minimal and limited to small surface disturbances. The timber harvest, fuels reduction, and culvert replacement projects have a small project footprint relative to the 7th field watershed. None of these activities is expected to affect instream flows, including stream temperature, sediment, channel stability, or groundwater systems within the project area or the 7th field watershed. Therefore, the current condition of the channel in relation to the ongoing activities within the watershed will not combine to result in adverse cumulative effects.

Alternative 2

Direct Effects and Indirect Effects

Based on the results of geomorphological assessment, and hydraulic analysis, the project will enhance existing slow water side channels, create self-maintaining alcoves at the downstream ends of the side channels, and convert two seasonal ponds to cool water perennial ponds. Those features would be further enhanced by the installation of large wood features which will facilitate geomorphic processes and create side channel habitat. Additionally, diverse riparian planting will result in increased shade, direct flows to enhance side channel stability, capture fine sediment for further vegetation recruitment, and result in future large woody debris. The combination of which will greatly increase river access to the floodplain and increase off-channel habitat complexity within the project area.

During project design, it was determined that the extreme low flows during summer 2015 contributed to low summer DO and water temperature throughout the project area. Though DO and temperature were poor to marginal in Willow Pond and somewhat better in Kelly Pond, it is expected that more normal flow conditions and air surface mixing (Greig et al., 2007 and Wilson 2010) will result in increased DO levels in the enhanced ponds as compared to the monitoring period for the project. Additionally, DO may also increase as planted riparian vegetation matures, which will decrease water temperatures in the ponds allowing the water to hold more DO and the plant roots will leak oxygen into the water (Brix 1997 and Sand-Jensen et al., 1982).

It is very unlikely the project will result in changes to the existing channel of the North Fork Salmon River. Because the side channels were created during extreme flow events, only extreme flow events can reshape them, which has resulted in the side channels persisting since 1964. Therefore, making small adjustments to the river and its floodplain to improve habitat complexity on the river bars is expected to persist for a long period of time and not alter the main river channel. The enhancements to the side channels are intended to increase the magnitude and frequency of flows into those channels, but are expected to remain stable because optimum flow inlet (40°) and outlet angles (20°) and flow rates (10-20%) were used to design the enhancements and the channels will be further stabilized by riparian planting. On Kelly Bar the overflow channel will become active at about 1.2-year events, rather than the current 2.2 year events. On West Bar the mid-bar channel will be activated annually, rather than during 1.1 year events, and water levels will be raised locally at the back-bar channel inlet. The channels will be self-maintaining, since they will receive flows frequently enough to scour out fine sediments from the channels and alcoves. Engineered log jams will protect the inlets from scour, limit the amount of flow entering the side channels, and reduce the possibility of river channel alignment shifts. Small wood structures will direct flows within the side channels, creating localized scour pools for energy dissipation and gravel sorting, and will rack additional woody material, further increasing the habitat diversity of the project area.

Kelly Pond and Willow Pond will be maintained by cooler groundwater to a depth of 3 to 4 feet. The ponds will have seasonal channel outlets, disconnecting the ponds from surface flows slowly as they

subside. Since Willow Pond will likely have low DO concentrations by late June (depending on the water year) resulting in fish avoidance of the pond (Carter 2005 and Henning et al., 2006), the pond was designed to slowly disengage in July and August, allowing fish to avoid low DO levels. In the event that pond water quality does not meet desired summer conditions, they will be altered to become seasonal ponds. To avoid affecting the geomorphology and hydrology of Kelly Gulch, the outfall channel of Kelly Pond will be separated from Kelly Gulch. Boulder weirs, similar to natural river bar conditions, will be used to provide profile control in the outfall channel.

Most of the construction will occur out of the river channel, when the side channels and ponds are dry. However, enhancement of the alcoves will require isolation of the alcoves from the river channel. Water from the isolation operations will be pumped to a flat area away from the work area and allowed to infiltrate into the ground. Construction will require that equipment cross the river to access West Bar using a temporary bridge. The location of the temporary bridge is on a stable, rocky, shallow riffle and will result in limited channel disturbance. Abutments will be constructed of materials on-site from existing spoils locations. The bridge will be placed on the riverbank and out of the channel. Turbidity controls during placement will not be applied since velocities would make them ineffective. Equipment will cross in the wet several times in order to place the bridge. Once placed, all crossings will be dry. Turbidity as a result of the wet crossings and abutment placement will be very localized and short-term. Standard BMPs will be applied to placement activities. If river velocities allow, a boom will be placed downstream of the equipment during the first crossing. A temporary culvert will be placed at the equipment access crossing Kelly Gulch, which will have low to no flow during the work window.

Within the short-term (2 years) timeframe, the proposed action has the potential to increase sediment loads within the North Fork Salmon River. Where soil and vegetation are disturbed by construction activities water is more likely to erode and deliver sediment, which is currently stored in terrace and floodplain deposits, to the river increasing turbidity. No colluvial, non-riverine sediments will be at risk of being discharged to the North Fork Salmon River. However, the incremental area of ground disturbance for the project is less than 4 acres, a range with a moderate risk of increased sediment within the river system. Much of the disturbed area is comprised of gravels and cobbles which are resistant to erosion, especially considering that they lie on a floodplain, which is a depositional feature under all but extreme storm events. Though the project area lacks fine sediment, any eroded fine sediment would increase turbidity in the streams. The initial suspended sediment release is expected to be short-term, with the amount of suspended sediment rapidly dropping to pre-construction levels both in time and space (Sear et al. 1998; Madej 2001; Brown 2002; Foltz and Yanosek 2005). Most erosion will occur in the few precipitation events following construction, with long-term stabilization occurring once vegetation establishes (Sear et al. 1998; Madej 2001). These short-term impacts will be reduced by working during dry conditions and placing erosion controls prior to, during, and after construction.

The river banks will be minimally disturbed as a result of construction; most disturbance will occur within poorly vegetated side channels well away from the main channel, resulting in about 1,850 linear feet total disturbance. Within the long-term (10 years), the proposed action has the potential to adversely affect stream temperature through a reduction of shade from riparian vegetation where construction work removes canopy cover. However, the incremental area of vegetated riparian disturbance is about 0.25 acres; primarily Himalayan blackberry which does not provide meaningful shade. The potential long-term impacts can be expected to last no more than 10 years because the proposed project includes riparian planting along barren side channels and poorly vegetated ponds which will create about 1 acre of diverse riparian vegetation. To minimize vegetation removal the alignment of each side channel generally followed the alignment of the existing high-flow channel. Impacts to established native vegetation were

avoided as much as possible and no trees will be removed along the North Fork Salmon River or Kelly Gulch.

The enhanced off-channel complexity will increase slow water habitat by creating roughness in the system, which will decrease stream velocity. Slowing stream velocity will improve subsurface groundwater retention within the floodplain, increasing the amount and residence time of hyporheic flow, which will enhance riparian vegetation and result in increased shade (Poole and Berman 2001; Sawyer and Cardenas 2012). Reduced stream velocity in flood events will also facilitate deposition of sediment and more natural floodplain processes. This has a beneficial indirect effect on water temperature within the North Fork Salmon River by maintaining hyporheic flow longer into the water year, providing cool water inputs to the North Fork Salmon River during critical summer months for salmonid rearing, benefiting TMDL implementation goals.

Although temporarily increasing temperature and sediments loads in the short term is possible, the potential effects must be put into perspective. When one considers the area of disturbance in comparison to the 7th field watershed area, it is clear the overall potential effects on stream temperature and sediment regime should be very small (insignificant), if not imperceptible, within the short-term and absent during the long-term. The disturbance is expected to be about 4 acres (0.10% of the 7th field watershed).

For a detailed description of the analysis used to develop this project refer to the *Kelly Bar Off-Channel Fisheries and Riparian Habitat Enhancement Project – Basis of Design Report* (Michael Love and Associates 2016).

Additionally, an annual Monitoring Memoranda will be prepared each year for the three years following construction of the project. The report will summarize monitoring activities, findings, and recommendations. The annual report will also identify any issues that may warrant maintenance or other types of treatment. In the event that items of concern arise, the report will recommend actions to be initiated to further characterize its impact on project objectives and/or consultation with the CDFW, USFS, and MLA, as well as any other appropriate resource agencies, to determine if a maintenance action is warranted. All monitoring and reporting will be conducted by SRRC.

SRRC will try to monitor water temperature and DO once per week during summer baseflow, dependent on existing conditions and current observations, for three years following construction. Temperature and DO will be monitored throughout the water column in the ponds monthly for three years following implementation of the project, and during late summer drought conditions for the following two years, for a total of five years of post-implementation monitoring. Additionally, SRRC will track notable river flows at the site, tracking at what flows the channels engage and when they disconnect from the features. Annual inspections of all features will occur for the life of the project and will include stability of the log structures and sedimentation.

Photo monitoring will be conducted to document physical and vegetative response to all features and identify any issues of concern that may require maintenance. During the first three years after construction, photo-point monitoring will be conducted twice a year: once during focus the period for fish usage (late fall through mid-spring) and once at the beginning of the summer after high spring flows have subsided. Additional photos will be taken during notable flow events. Observed changes at all features will be noted in the annual report, with particular focus on: functionality and stability of log structures; sedimentation patterns within the pond; natural regeneration of native vegetation; overall revegetation plant success; and encroachment into the project area by invasive vegetation.

Cross Sections and Water Depth Surveys will be conducted in the ponds and alcoves once per year for three years after construction. Surveys will be conducted during the focus period for fish usage. The survey will also be used to evaluate water depths during the time of survey to ensure passage criteria are satisfied. Conditions permitting, a flow measurement in the connecting channels will also be taken during the time of survey.

Inspection of revegetation measures will include condition of streambank erosion control measures, numeric survival by species and overall qualitative health and vigor of revegetation and natural recruitment. Areas of revegetation will have pre- and post- project photo-point monitoring using GPS-located monitoring sites in early summer. Additionally, SRRC will monitor erosion and vegetation for five years, at which point the need for continued monitoring will be assessed. If, revegetation efforts fail and natural regeneration is inadequate, remedial actions will be recommended.

The USFS is the primary contact for initiating any necessary maintenance for the completed project. SRRC will identify any necessary maintenance, as they conduct annual inspections of the project site and will be responsible for initiating and obtaining any required permits for maintenance.

At the end of this five-year period, the schedule for additional monitoring will be re-evaluated to determine optimum monitoring schedules and techniques for the life of the project.

Cumulative Effects

The effects of mining activity within the watershed is minimal and limited to small surface disturbances. The timber harvest, fuels reduction, and culvert replacement projects have a small project footprint relative to the 7th field watershed. These activities are not expected to affect instream flows, including stream temperature, sediment, or geomorphology, within the project area or the 7th field watershed.

Therefore, the addition of this project to the ongoing activities within the watershed (mining, timber harvest, and fuels reduction) will not combine to result in adverse cumulative effects. Therefore, restoration activities will not produce adverse cumulative effects to water quality due to the small size for the project and specified Project Design Features and Best Management Practices which will mitigate potential impacts of the project.

Compliance with law, regulation, policy, and the Forest Plan

The Klamath LRMP Record of Decision (ROD) is the guiding document for all Forest projects. The Klamath LRMP includes reference to the Aquatic Conservation Strategy (ACS), which incorporates specific standards and guidelines for riparian reserves set within the overarching Northwest Forest Plan (ROD to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl) (USDA Forest Service and USDI Bureau of Land Management 1994). All projects within Riparian Reserves on the Klamath National Forest must therefore be consistent with the objectives, standards, and guidelines of the ACS. The project is located in the Riparian Reserve Management Area (MA-10). Forest-wide standards and guidelines include direction to maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. These include, but are not exclusive to, standards and guidelines: 9-1, 9-4, MA10-13, MA10-17, MA10-18, MA10-19, MA10-20. The project is consistent with the LRMP standards and guidelines, including the ACS objectives (for details please see the Forest Plan Consistency Checklist within the project record and Appendix C for ACS compliance).

The North Coast Regional Water Quality Control Board and US Environmental Protection Agency have listed the Salmon River as impaired due to elevated water temperatures. The Salmon River TMDL and Implementation Plan was prepared to reduce the temperature issues in the watershed over the long-term

(NCRWQCB, 2005). By enhancing riparian vegetative shading and increasing hyporheic flow, this project will cool flows into the North Fork Salmon River, benefiting both anadromous fisheries recovery and TMDL implementation goals.

The project is covered under the programmatic US Army Corps of Engineers Clean Water Act section 404 Regional General Permit 12. A Water Quality Certification (Clean Water Act section 401) is in progress and a Construction General Permit Waiver has been received from the State Water Resources Control Board. The project will comply with all permit requirements, which will be finalized prior to implementation. Thus, the project will be in compliance with the Clean Water Act. A Section 1600 Streambed Alteration Agreement with California Department of Fish and Wildlife is in progress; though it is not required on federally managed lands, it is required by the funding agency.

Water Quality Project Design Features

Design Feature	Description
WS -1	<p>For activities that occur within Riparian Reserves, the Normal Operating Season (NOS) will be June 1st to November 15th. Ground disturbing activities will also be restricted during periods of wet weather during the NOS. See BMP 1.5 (Appendix B).</p> <p>However, the more restrictive CDFW NOS of “June 15th to November 1st, or the first significant rainfall, whichever comes first”, will be applied to this project.</p>
WS - 2	Mulch and/or seed areas disturbed by restoration activities where sufficient levels of soil cover are lacking.
WS - 3	<p>Erosion control and other requirements to protect water quality are described in BMPs (Appendix B).</p> <p>If “conditions arise or change in such a manner as to be considered deleterious to aquatic life, operations shall cease until corrective measures are taken” by CDFW.</p>

Design Feature	Description
WS - 4	<p>The designated project drafting site is within a Pacific salmonid-bearing stream reach. Therefore, <i>NOAA Fisheries Water Drafting Specifications</i> guidelines will be used. They include, but are not limited to, the following:</p> <ol style="list-style-type: none"> 1. When in habitat potentially occupied by Chinook and Coho salmon, intakes will be screened with 3/32-inch mesh for rounded or square openings, or 1/16-inch mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8-inch mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/second. <ol style="list-style-type: none"> a. Use of a NOAA approved fish screen will ensure the above specifications are met. 2. Fish screen will be placed parallel to flow. 3. Pumping rate will not exceed 350 gallons-per-minute (gpm) or 10% of the flow of the anadromous stream drafted from. 4. Pumping will be terminated when tank is full. <p>For any water drafting that occurs in non-fish bearing waters, Forest Service BMP 2.5 defines restrictions (Appendix B).</p> <p>All water drafting will avoid having any effect on the amount of cold water in thermal refugia at creek mouths and seeps.</p>

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